

Poster presentation

Reliability analysis of functional CNT

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Due to extraordinary mechanical electrical and optical properties CNTs have attracted a great deal of attention. In order to transfer their outstanding properties from nano to micro scale one essential step involved is CNT functionalization. We have studied the various functionalized Carbon Nano tube like the fluorinated CNTs, CNT amines [1] and result show that functionalization has many challenges and to use functionalized [2] CNTs in devices is even more challenging.

We have tried to analyze the Reliability [3] and reported the Failure Analysis, Failure Mechanisms, and Failure Modes [4] of Functional Carbon Nanotube based devices based on the chemical reactivity of functionalized CNTs. Result show that CNTs when used in sensors [5] will be in contact with the environment and hence we have concluded that though reliability [6] and failure depends on the functional part of CNT but we can create categories and subdivisions thereby making study and problem-solving easy. We have reported the failure-free time for the functionalized CNTs, which is a probabilistic variable and varies with the change in the functional group associated with the CNT which is based on the chemical reactivity of various functional CNTs. We have computed these probabilities for a sufficiently pure sample of the particular functionalized CNT. The probabilities are MTBF (Mean Time between Failures) and MTTF (Mean Time to Failure) for the specific functionalized CNT.

We have done modeling and computation on MATLAB and made a small library *cntfrel*, which provides user to work on some of the functionalized CNT and study their properties like reactivity at different environments and

calculate some aspects of reliability like Failure Modes, Failure Mechanisms, and Failure Analysis. Result show that we can predict the phenomenon using tools like MATLAB, which can accelerate the research in calculating reliability of Functional CNT based devices.

References

1. Abiman P, Wildgoose GG, Compton RG: *Int J Electrochem Sci* 2008, **3**.
2. Tasis D, Tagmatarchis N, Georgakilas V, Prato M: *Chem Eur J Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim*; 2003.
3. Jeng S-L, Lu J-C, Wang K: *IEEE Trans on Reliability* 2007, **56**(3):.
4. Vallett DP: *IEEE Trans on Nanotech* 2002, **1**(3):.
5. Sotiropoulou S, Chaniotakis NA: *Anal Bioanal Chem* 2003, **375**:103-105.
6. Bae SJ, Kang CW, Choi JS: *IEEE International Conference on Management of Innovation and Technology* 2006.